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Editorial

A tribute to Peter George Brewer in celebration of his 65th birthday

Peter George Brewer is an ocean chemist of the rare breed that can cross back and forth over the divide between being a front-line research scientist and being a research executive. As if that is not remarkable enough, in the process, he has also demonstrated sustained growth in the depth, breadth, and diversity of his scientific endeavors. Some of his formidable contributions to ocean chemistry have already been highlighted in a profile of him as a major mover and shaker in the field (Irion, 2001). Here, we provide additional glimpses of him from the perspective of a group of individuals who have worked directly under his mentorship and have followed his career closely through several decades.

Peter Brewer was born in Ulverton, Cumbria, UK in 1940. He received his B.Sc. (1962) in chemistry and Ph.D. (1967) in chemical oceanography from Liverpool University, England. Immediately upon his graduation, he left England, joined the Chemistry Department of the Woods Hole Oceanographic Institution (WHOI), and began a decade-long collaboration with Derek Spencer. Since he had his graduate training under the tutelage of J. P. Riley and his thesis work was on the geochemistry of the Red Sea brines, it is not surprising that the focus of his early work at WHOI was on the geochemistry of minor elements and trace species, including radioactive nuclides, in the oceans with a significant emphasis on the development of analytical methods for their determination and their behavior under contrasting redox conditions in anoxic basins. When the Geochemical Ocean Sections Study (GEOSECS) came into being a short time later, Peter became a natural and active participant in that program. Subsequently, he was involved extensively in the leadership in the overall design and implementation of its progeny, the Transient Tracers in the Ocean (TTO) program. Through those years, Peter also rose through the ranks at WHOI.

A major evolution in Peter's research interests occurred in the late seventies, when he delved into the interactions between phytoplankton growth and the marine carbonate system and published his seminal work on how the penetration of anthropogenic CO_2 into the ocean might be assessed with a stoichiometric model that coupled the concomitant changes in the concentrations of the nutrients and those of the inorganic carbonate species (Brewer, 1978; Goldman and Brewer, 1980). As a result, when he assumed the interim position of the Program Director of the Marine Chemistry Program of the National Science Foundation for two years in 1981, he contributed significantly to the intellectual and administrative leadership that was needed for the birth of the U.S. Global Ocean Flux Study (USGOFS), a research program that was centered on the marine carbon cycle and its role in the regulation of the concentration of atmospheric CO_2. The USGOFS program gained wide support from the international oceanographic community, and it quickly evolved into the Joint Global Ocean Flux Study (JGOFS) under the auspices of the Scientific Committee on Oceanic Research (SCOR) (Brewer, 2003). Peter served as the vice-chairman of its initiating science steering committee, and the contribution of JGOFS to the integrated approaches between biological and chemical oceanography in the last couple decades can hardly be overemphasized.

Peter's service at the National Science Foundation was his first major foray into the ranks of research executives. However, his first love is still the science itself. At the end of his tenure at NSF, he returned to WHOI, resumed his career as a front-line research scientist, and devoted almost a decade of work primarily to the chemistry of the marine carbonate system and to the steering of JGOFS as it grew into maturity.

The next major turn in Peter's career came in 1991, when he answered the call of David Packard to become the director of the Monterey Bay Aquarium Research Institute (MBARI). His capacity as a research executive was put to the test, and he passed it with flying colors. In his six-year tenure at MBARI, he set a scientific course and developed the infrastructure, including the construction of its first major dedicated research vessel, for it to grow and prosper. Then in

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Table 1
Collaborators of Peter Brewer (listed in chronological order)

Student	Post-doctoral	Visiting scientists
PhD		
James W. Murray (co-advisor)	Nelson Frew	Shizuo Tsunogai
Michael P. Bacon (co-advisor)	David Glover	David Dyrssen
George T.F. Wong	Catherine Goyet	
Mary I. Scranton	Gregor Rehder	
Robert F. Anderson (co-advisor)	Sheri White	
Hein J.W. de Baar	Noriko Nakayama	
	Rachel M. Dunk	
MS	Keith Hester	
George T.F. Wong		
Wei-Min Hao		

1996, Peter once again stepped away from his executive position and returned his focus to specific research problems. This time, he decided to venture in yet another new direction, into oceanographic research that has an immediate societal impact: the geochemistry of marine gas hydrates and their role as a potential new source of energy and a potential vehicle for the sequestration of atmospheric CO_2 in the deep ocean. By utilizing the superb engineering capability at MBARI, he has been able to forge a unique experimental approach involving deep submersibles for studying the behavior of gas hydrates *in situ*, and he remains at the forefront of these lines of research. This effort is still under active development (Brewer et al., 2006), and we expect exciting results in the years to come. Thus, while Peter has already contributed some 150 publications to the literature, more are sure to follow.

Peter has not spent any significant part of his career in an educational institution. Thus, he has not had the opportunity to produce many students. However, he took advantage of whatever opportunities the WHOI–Massachusetts Institute of Technology joint program could offer him while he was associated with WHOI, and we are the product of that effort. There are, of course, many others who, although not formally Peter's students, would readily count Peter as a significant mentor in their professional development (Table 1). Being trained under the British system in the Riley school, as a mentor, Peter makes sure that his students produce good numbers, and he gives them sufficient intellectual pressure to keep them honest while at the same time allowing them ample room to grow into independent scientists. This mentoring philosophy fits nicely with that during the formative years of the WHOI–MIT joint program, when students were not supposed to work in the primary research interests of their advisors. Peter gives those whom he mentors the foundation to move into research directions that are diverse and are distinctly different from his own. Nevertheless, Peter strives to be not just a mentor but, first and foremost, a lifelong friend. To them, he leaves his British formality aside and becomes just the quintessential "Pete".

Peter has also served the oceanographic community extensively in other ways, as an associate editor of several journals, as an officer in professional societies, as chairman and a member of many boards and panels, and as a witness before many governmental hearings. For his long list of contributions to the ocean sciences, and ocean chemistry in particular, among the honors that he has received, he has been elected as a fellow of both the American Association for the Advancement of Science and the American Geophysical Union.

This tribute to Peter on the occasion of his 65th birthday is by no means an epilogue to a distinguished career. With his diverse activities and the level of energy that he is still putting into his science, it is a story that has chapters to go.

An account of Peter's professional achievements would be incomplete without mentioning the quiet, sustained, and unequivocal support that his wife, Hilary, has given him through the decades. Her hospitality and friendship to us are also deeply appreciated.

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